purchased by him much beyond the value of the cattle which he has maintained on it through the famine, and that he would have been far better off if he had sold his cattle immediately scarcity was inevitable for what they would fetch, and purchased the bullocks absolutely necessary for cultivating his land after the break of the monsoon. If advances of takavi are made on a too liberal scale for purchase of fodder the total takavi outstandings in the district and in the whole Presidency are unduly inflated. It is advisable as far as possible to encourage cash purchases of Government grass and restrict advances of takavi for fodder to bagayat holders only, or to really well-to-do people who have good cattle worth preserving. Advances for purchase of bullocks in the next cultivating season after a period of scarcity are both necessary and advisable. Small loans for purchase of seed are of more doubtful value. Experience shows that in the most famine stricken tracts the land is always sown after the severest famine even if takavi advances for seed are not given freely. Such advances then taken ostensibly for purchase of seed are generally utilized for maintenance only. Loans admittedly for maintenance (*khavti*) should be advanced very sparingly in all districts and should be confined as far as possible to holders of bagayat lands, who find it difficult to maintain themselves during the period between sowing and harvesting their crops. Other cases in which takavi for maintenance is advisable are very few indeed.

3. When takavi loans are given on the joint bond system or to individuals for large works such as building dams across streams, putting up *tals* along a sloping hillside, or works of similar nature which require careful selection of sites, preparation of plans and expert supervision while they are being carried out, the officer granting the loans must insist that the borrowers agree to have the site and plans approved by the Executive Engineer and the works supervised by the local Public Works Department officers before any money is actually advanced to them. In such cases where the work is of real value to the borrowers or to the community and is likely to afford needed employment in the locality, the fees usually charged by the Public Works Department for supervision, &c., shall be waived.

4. In order to expedite the distribution of takavi during scarcity or famine, it is usually the practice to confer enhanced powers under the Takavi Act on Mamlatdars and Relief Head Karkuns. While it is essential that loans of takavi, which are really needed by the people and are likely to be of advantage to the borrowers or to the people employed by them, should be advanced with as little delay as possible, care should at the same time be taken to select only those officers among the Mamlatdars and the Head Karkuns for the conferment of enhanced powers, who can be trusted to exercise them with discretion. In no case should any officer below the rank of a Sub-Divisional Officer be allowed to advance takavi for maintenance and enhanced powers for advancing loans under the Land Improvement Act should not as a rule be given as freely as enhanced powers under the Agriculturists' Loans Act. The work of all officers to whom enhanced powers of advancing loans have been given should be carefully watched by the Collector and the Sub-Divisional Officer, and any tendency on the part of these officers to grant loans extravagantly or without due discretion should immediately be checked by them.

APPENDIX XIII

(*See* section 235)

Utility of temporary dams in streams to prevent waste of water in years of deficient rainfall

In places in which there is a very heavy rainfall confined to about four months followed by eight months of drought it is a matter of importance to retard the flow of water to the sea as much as possible and to retain all that can be retained through the dry season. Even in ordinary years considerable improvement can be made in the hot weather water-supply, if small sums of money are spent in erecting a series of temporary dams soon after the rains in each of the chief streams and rivers in the neighbourhood of which water fails in the dry season. The necessity and importance of such measures are greatly enhanced when the rain fails.

2. The utility of these dams is not to be measured merely by the amount of water they hold up in the streams themselves, the general raising of the water level of the neighbourhood is also an incidental advantage. The impoundment of water at numerous places along a river reduces the force of the torrent and consequently the washing away of soil further down. On the other hand, the dams may keep back from the lower villages water that would have come to them had there been no dams; but the complaint will come only from those who neglect to make dams for themselves, and anyhow they probably gain considerably by the gradual percolation of the water held up at the higher level.

3. One more advantage of the construction of dams in years of scarcity is that it provides labour for the class of people who are first hit by a famine—the day labourers who are usually employed in harvesting crops. Moreover, it supplies them with labour

near their homes and with labour which means little or no expense in the way of tools and establishment, for the villagers themselves will in their own interests see that the work is properly done and only need to be stirred up to get it done early and to be instructed as to how, when and where to build the dams.

4. The dams should generally be built up early, *i.e.*, in September, but the proper time for starting work on them should be left to the judgment of the local authorities of the district. If the work is started too early so much water will be impounded that it will be impossible to build a dam strong enough to hold it at reasonable cost; if it is started too late there will not be enough water saved to justify the cost of the dam. Farther down the source of the stream a later date might be suitable. Experience has shown that the dams should not be confined only to broad rivers, and that temporary dams are sometimes better than costly and *pucca* masonry ones.

5. With a view to facilitating the wider and readier adoption of the measures described above in a year of scanty rainfall and even in ordinary years the Local Boards aided by the usual annual Provincial water-supply grant might have holes bored in the rocky beds of rivers to receive vertical-stakes to be used in the construction of temporary dams. In villages in which materials for building dams are not readily to be found, the Local Board might also lay in a stock of stakes, stones and boards to be used for constructing dams, when necessary, and to be removed again into safe custody at the end of the hot season. There are many Irish bridges on roads in charge of the Public Works Department at which a few feet of water might with great advantage and at little expense be easily held up or at any rate its escape retarded by simply placing boards between uprights fixed in the masonry work when the water gets low. This measure might be adopted every year, only earlier in famine years than in others. In ordinary years a gradual advance can be made towards preparation for the immediate adoption in years of scarcity of all the necessary measures by the expenditure of a small sum every year. All that need be done at once is the selection of sites suitable for dams at intervals averaging, say, one mile in every important stream in the neighbourhood of which there was scarcity of water in 1899-1900.

6. The dams may be constructed under the supervision of the Local Board Overseer by the people themselves without skilled supervision. The people should be encouraged to start building the dams early enough. The officer on the spot should promise a lump sum after inspecting the site of the proposed dam; the sum promised should be a fraction of the estimated cost, from one-third to two-thirds according to the people's capacity to pay; a small advance should be given to the patil; and if the work was taken in hand promptly and well executed, the full sum promised should be made up after inspection of the completed dam. In cases of delay or bad workmanship the full sum promised should not be paid and in cases in which the dam proved useless through delay, the advance should be recovered.

7. There is the danger of water becoming stagnant and contaminated by cattle. This should be guarded against by the employment of two village watchmen, put on dole for the purpose, to keep cattle from entering the water and people from bathing or washing clothes in it. It would generally be feasible to allow a little water to flow round one end of the dam and to appoint places for washing clothes or watering cattle below the dam. It would be a good arrangement to have one or two iron or even India rubber syphon-pipes thrown over each dam for this purpose, smaller dams being supplied below the big dam to impound the water escaping through the syphons in separate places for different purposes. As the water gets scarcer the people should be warned not to take it for drinking purposes direct from the stream, but to dig holes in the bed of the stream or even on its banks near the impounded water and reserve the water in those holes for drinking purposes; this is a most successful measure and the people will get practically filtered water to drink and much more of it than they would if the dams had not been built.

8. The measures advocated will not serve to save crops except in the immediate vicinity of the dams; but they will greatly mitigate drought and so benefit both men and cattle in many areas which are not reached by the larger schemes of storage of water that are contemplated by Government and may therefore be considered as ancillary measures, along with these larger schemes.